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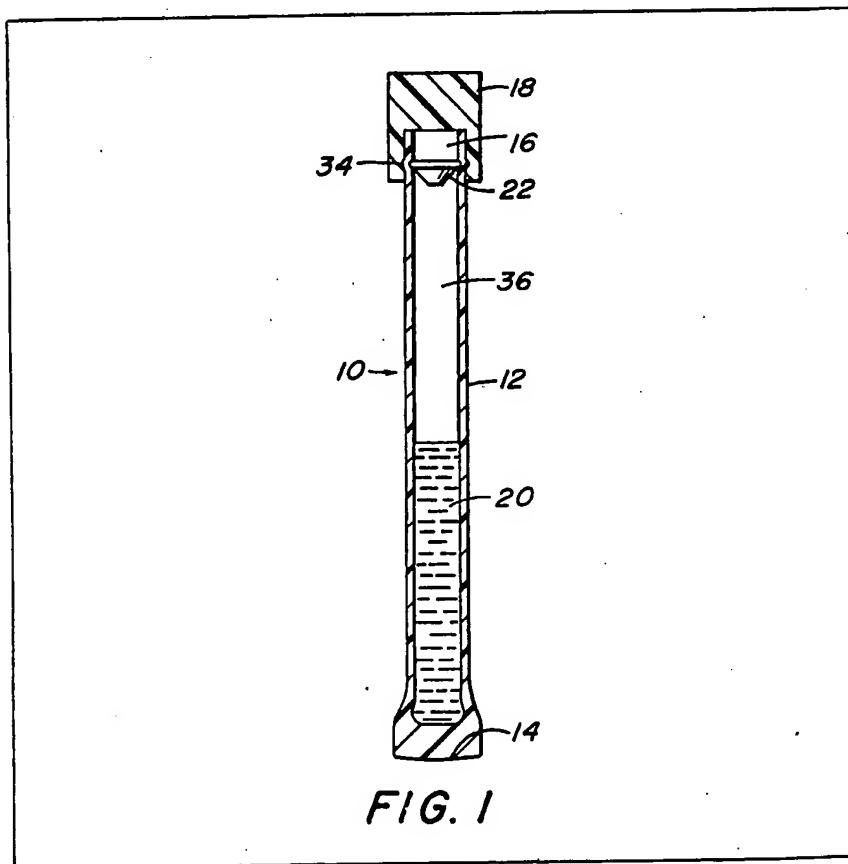
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(54) Self-contained swab unit

(57) A self-contained swab unit 10 comprises a hollow cylinder 12, closed at one end and having a foam rubber or other swab 18 capping the other end, containing a cleansing or sterilizing solution or other liquid 20; the cylinder is sealed between the swab and the liquid by a conical plug 22 having a base slightly larger than the inside diameter of the cylinder, so that the liquid is sealed away from the swab when not in use; by squeezing the cylinder, the plug pivots to allow the liquid to pass and saturate the swab, while on releasing the squeeze pressure, the plug pivots back to give a partial seal and allow control of the amount of liquid used in swabbing with the unit.



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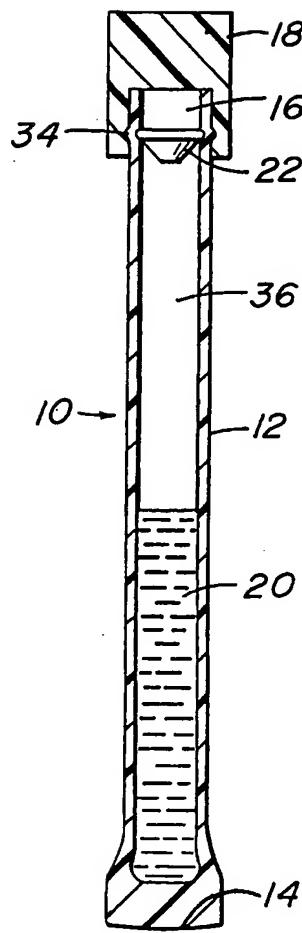


FIG. 1

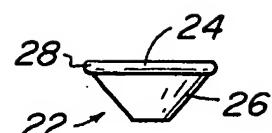


FIG. 2

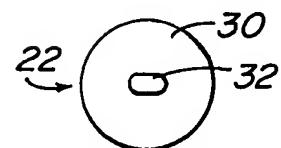


FIG. 3

SPECIFICATION**Self-contained swab unit****5. BACKGROUND OF THE INVENTION**

This invention is related to our U.S. patent application for a "DISPOSABLE SWAB and CULTURE UNIT" filed the same day as this application, and incorporated herein by reference.

A self-contained disposable swab is a useful device, particularly for medical applications. Prior to such self-contained devices, the various swabbing solution, such as germicidal soap, detergents, and medications were stored in capped bottles containing much more solution than would normally be necessary for a single use. Dry absorbent swabs, such as the common cotton swab on a wood stick were kept in separate boxes. The user normally selected one such swab and dipped it into the swabbing solution appropriate for the task. There were several inconveniences associated with this older method. The primary inconvenience was the necessity of carrying along relatively large bottles of the various solutions in doctors bags or first-aid kits. Additionally, where the swab would be placed in contact with contaminants or bacteria, the swab could not be re-dipped into the bottle to get more solution. Instead, a new swab had to be used each time it was necessary to wet the swab tip.

Self-contained swab units have proven to be a convenient solution to the above-mentioned problems. Each unit carries an amount of solution judged to be approximately right for one usage. The solution is sealed away from the swab when not in use so that the unit may be stored and carried in a doctors bag or in a technicians portable kit until it is needed. The unit, exclusive of the solution, is relatively inexpensive and thus is suitable for disposable use. However, it would be desirable to provide an improved means of maintaining a rupturable seal between the swab and the liquid. Ideally, such a seal would be airtight and watertight even when the unit is subjected to minor blows, such as would occur in a doctors bag or technician's kit, and when placed under a modest weight such as other medical instruments being stored upon it. Yet the seal should be easily openable when the swab is to be used. Additionally, it would be an advantageous feature if the seal would be partially closeable on demand so that the flow of liquid to the swab could be regulated.

Since the units are intended to be disposable, the cost factor is important. A seal that meets the operational requirements of the previous paragraph must also be capable of being installed in the unit inexpensively. This will almost invariably necessitate that the seal be installed by a simple automated process.

SUMMARY OF THE INVENTION

A disposable swab unit comprises a generally hollow cylinder having a closed end and an open end capped by a structure. The swabbing structure providing a swabbing means. A liquid medium is provided in the hollow cylinder. A plug having a conical face and a base portion slightly larger than the bore diameter of the cylinder is inserted within the bore of the cylinder to form a sealed chamber in the portion of the cylinder between the closed end and the plug for containing the liquid medium.

80 BRIEF DESCRIPTION OF THE DRAWINGS
For the purpose of illustrating the invention, there is shown in the drawings a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

85 BRIEF DESCRIPTION OF THE DRAWING
90 *Figure 1* is a longitudinal section view of a swab unit according to the present invention;
Figure 2 is a side view of the plug;
Figure 3 is a bottom view of the plug.

95 DETAILED DESCRIPTION OF THE DISCLOSURE

Referring to the drawings in detail wherein like numerals indicate like elements, the present invention is embodied in a disposable self-contained swab unit designated generally as 10. The unit 10 includes a cylindrical plastic tube 12 closed at one end 14 and open at the other end 16. Tube 12 is preferably made of plastic such as polypropylene or a copolymer blend selected to preserve the integrity of the seal chamber.

A foam rubber cube 18 caps the open end of tube 16. Cube 18 is herein shown as a foam rubber cube, but it will be understood that any suitable absorbent material may be used and any convenient geometric configuration may be employed, as the function of cube 18 is to absorb the swabbing solution and apply it to the area being swabbed. Cube 115 18 is attached to tube 12 by a suitable glue or adhesive.

A liquid solution 20 is loaded to a pre-determined amount in tube 12. The solution can be a liquid detergent, a germicidal soap, a medication or any of a variety of other liquids normally applied with a swab. When tube 12 is constructed of a transparent plastic, the liquid will be visible through the walls of tube 12. It may therefore be advantageous to use appropriate dyes to color code the various liquids in different swab units so that ready identification is available. Also, printing may be applied to the tube to identify the contents of the tube and/or instructions for use.

130 The liquid 20 is sealed away from cube 18

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- by plug 22. Plug 22 may be best viewed in Fig. 2. Plug 22 is generally conical, having a base portion 24 and a cone portion 26. The base portion 24 has a cylindrical surface defined along its outside diameter that will be referred to as the sides 28 of the base 24. A generally flat surface 30 is provided by the bottom of the base 24. Surface 30 contains a centering depression 32, shown as a rectangular depression in these drawings, so that a centering tool may be used to place the plug 22 within the tube. The plug 22 is preferably a plastic material integrally formed by injection molding.
- 5 The outside diameter of base 24 is slightly larger than the inside diameter of tube 12. When plug 22 is inserted into tube 12 and properly centered, the generally flat surface 30 is perpendicular to the wall of tube 12.
- 10 Tube 12 is preferably composed of a sufficiently pliable material such as polypropylene or a copolymer blend. In this manner, the wall of tube 12 will bulge outwardly as shown at 34 to accommodate the sides 28, thus creating a sealed cavity 36 in tube 12 which will serve as a reservoir for the liquid 20.
- In construction and assembly of the device, tube 12 is loaded to a pre-determined amount with liquid 20. Plug 22 is then inserted into the open end 16 of tube 12, with the conical face 26 of plug 22 entering open end 16 first. A centering tool (not shown) is used in cooperation with centering depression 32 to position and center plug 22 in tube 12. A suitable glue or adhesive is then applied either to the cavity in cube 18 or to the upper extremity of tube 12, and cube 18 is seated as a cap over tube 12. The glue, or adhesive, when dry, holds cube 18 in place.
- 15 The swabbing unit 10 is then ready for storage. In this position, the liquid 20 is sealed against contamination or evaporation. The foam rubber cube 18 is dry. The unit 10 can be stored in any position without having the liquid 20 saturate cube 18. The unit 10 can even withstand moderate jolts and weights without having the seal ruptured.
- 20 Immediately prior to use, the unit 10 is inverted so that cube 18 points downward, and tube is squeezed between the thumb and forefinger. The pressure of fluid 20 on conical face 26 causes plug 22 to pivot relative to the walls of tube 12. Liquid 20 then flows past plug 22 and saturates cube 18. When the user releases the squeezing pressure on tube 12, suction in tube 12 will pivot plug 22 back towards its sealing position. While the force of the suction will not be great enough to completely center and align plug 22 to its original position, it will cause sides 28 to contact the inside walls of tube 22, thus effecting a partial seal. This allows the user to control the rate at which he uses fluid 20.
- 25 It can thus be seen that the objects of the invention have been accomplished, i.e., pro-

viding a self-contained swab unit having an improved seal at a reasonable cost.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification, as indicating the scope of the invention.

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CLAIMS

1. A disposable swab unit comprising:
 - (a) a generally hollow cylinder having a closed end and an open end capped by a structure providing a swabbing means;
 - (b) a liquid medium within the hollow cylinder;
 - (c) a plug having a conical face and a base portion slightly larger than the bore diameter of the cylinder, the plug being inserted within the bore of said cylinder to form a sealed chamber in the portion of said cylinder between the closed end and the plug for containing the liquid medium.
2. A disposable swab unit as in Claim 1, wherein the swabbing structure is a foam rubber cube mounted over and encompassing the open end of the cylinder.
3. A disposable swab unit as in Claims 1 and 2, wherein the closed end of the cylinder is formed by a heating and crimping process.
4. A disposable swab unit as in Claim 3, wherein the cylinder is made of a plastic material.
5. A disposable swab unit substantially as shown and described.

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